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Type of NEWS proposal: Product-driven NEWS investigation

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Project Title: Effects of land-atmosphere coupling strength and soil moisture initialization uncertainty on subseasonal rainfall and temperature prediction

Abstract

The transformation of satellite retrievals into an improved weather or climate prediction (a product with potentially great societal and economic value) is not trivial and deserves much focused attention. The work proposed here addresses an important part of this transformation, namely, the potential for satellite-based soil moisture estimates to improve subseasonal forecasts of precipitation and temperature. Subseasonal refers to forecasts at 2 weeks to 2 months lead time, just beyond the limits of deterministic weather prediction and just short of one season.

More specifically, the work proposed herein addresses two critical and unexplored elements of the subseasonal forecast problem. First, we will analyze the effects of simulated climate biases and model parameterization details on land-atmosphere coupling strength, the ability of soil moisture anomalies to affect precipitation and air temperature. Through a series of experiments, we aim to characterize mechanistic controls on coupling strength (both in models and, by extension, in nature) and improve the simulation of coupling strength in the NASA GMAO and NCEP modeling and prediction systems. Second, we will quantify the translation of uncertainty in satellite-based retrievals of precipitation and surface soil moisture into estimates of uncertainty in profile soil moisture conditions and hence into uncertainty in subseasonal weather forecasts through extensive data assimilation analyses and model forecasting experiments.